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reflected spot of the laser beam 21 at the light receiving surface of the photodiode 23 is held at the above center position in accordance with the set constant distance between the probe and sample.--

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IN THE CLAIMS

Rewrite claims 1, 6-8, 12-14, 16, 19 and 22 as follows:

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1. (Once Amended) A scanning probe microscope comprising:

a cantilever having a probe close to a sample surface;  
an actuator provided with the cantilever for changing a distance between said probe and said sample;

a displacement detection system for detecting displacement of said probe; and

a servo controller outputting a control signal for controlling the operation of said actuator based on a detection signal output by the displacement detection system and a signal relating to a reference distance and holding a distance between said probe and said sample at said reference distance in measurement at a sampling position;

wherein said probe scans said surface to measure said surface while holding the distance between said probe and said sample at said reference distance at each of a plurality of said sampling positions;

said scanning probe microscope further comprising;

133  
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an approaching and separating means for controlling the operation of said actuator so as to make said probe approach to the sample surface for measurement at each of said sampling positions and then make said probe separate from the sample surface;

wherein the state of the servo control by said servo controller is continued at least when said probe is made to approach the sample surface and during measurement at said sampling points.

6. (Once Amended) A scanning probe microscope as set forth in claim 4, comprising:

134  
a movement mechanism for making said probe scan the sample surface over an area;

wherein, when said probe scans said sample by on the operation of said movement mechanism and said second piezoelectric element makes said probe extend to the surface of said sample for measurement at said sampling position, said first piezoelectric element makes said probe move in tandem at an equal speed in the same direction as the scan motion by said movement mechanism and said first piezoelectric element functions as an auxiliary movement mechanism.

7. (Once Amended) A scanning probe microscope as set forth in claim 1, wherein:

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said probe has a predetermined aspect ratio and said probe measures a surface with a predetermined aspect ratio.

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8. (Once Amended) A method of measurement performed by a scanning probe microscope provided with a cantilever having a probe close to a sample surface, an actuator provided with said cantilever for changing a distance between said probe and said sample, a displacement detection system for detecting displacement of said probe, a servo controller for outputting a control signal for controlling the operation of said actuator and holding a distance between said probe and said sample at said reference distance in measurement at a sampling position based on a detection signal output by the displacement detection system and a signal relating to a reference distance, and a movement mechanism for making said probe scan the sample surface, and said method of scanning said surface by said probe to measure said surface while holding the distance between said probe and said sample at said reference distance at each of a plurality of said sampling positions,

further said method of measurement comprising:

a step of making said probe approach to the said sample and separate from said sample to obtain measurement data at each of said sampling positions while continuing the state of servo control relating to the distance between said probe and

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said sample by said servo controller at least when said probe is made to approach the sample surface and during measurement at said sampling points.

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12. (Once Amended) A method of measurement of a scanning probe microscope as set forth in claim 8, further comprising a step of making said probe scan the sample surface over an area.

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13. (Once Amended) A method of measurement of a scanning probe microscope as set forth in claim 8, wherein;

a probe with a high aspect ratio is used as said probe and said probe measures topographic features with a predetermined aspect ratio formed on a semiconductor substrate.

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14. (Once Amended) A scanning probe microscope comprising:

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a probe close to a sample surface; and

a servo controller for holding a distance between said probe and the surface of said sample at a reference distance during measurement at a sampling position;

wherein said probe scans said surface to measure said surface while holding the distance between said probe and said sample at said reference distance;

said scanning probe microscope further comprising:

a movement mechanism for making said probe scan the surface of said sample over an area;

B9  
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an approaching and separating means for making said probe approach to the surface of said sample at said sampling position and make said probe separate from the surface of said sample during movement between sampling positions; and

an auxiliary movement mechanism for making said probe move in tandem at an equal speed in the same direction as the scan motion of said movement mechanism when making said probe approach to the surface of said sample for measurement at said sampling position.

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16. (Once Amended) A method of scanning performed by a scanning probe microscope provided with a probe close to a sample surface and scanning said surface with said probe to measure said surface while holding the distance between said probe and sample at a predetermined distance,

said method of scanning being performed for a predetermined measurement area at the sample surface, a plurality of scattered sampling positions are set in said measurement area, and scan motion by a movement mechanism is performed for measurement at each sampling point, and

said method of scanning is comprised of:

a step of making said probe separate from the sample surface during movement between sampling positions,

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a step of making said probe approach to the surface of said sample for the measurement at each of said sampling positions, and

a step of causing scan motion for tandem movement at an equal speed in the same direction as the scan motion of said movement mechanism by an auxiliary movement mechanism when said probe approaches to the sample surface for measurement.

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19. (Once Amended) A scanning probe microscope comprising:

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a probe close to a sample surface;  
a displacement detection mechanism for detecting displacement of said probe in a height direction with respect to the surface of said sample; and

a control circuit for control so as to hold a distance between said sample and said probe at said reference distance based on a detection signal output by said displacement detection mechanism and a signal relating to the reference distance; wherein

said probe scans said surface to measure said surface while holding the distance between said probe and said sample at said reference distance,

said scanning probe microscope further comprising:

a movement mechanism for making said probe scan the surface of said sample over a predetermined area;

a piezoelectric element for making said probe displace in a height direction of said sample with respect to said surface;

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a reference distance setting means for giving a voltage signal determining said reference distance;

an approaching and separating signal supplying means for giving a voltage signal for making said probe approach to and separate from the surface of said sample;

a combining means for combining a voltage signal determining said reference distance and said approach and separation voltage signal; and

a subtracting means for calculating a difference between a voltage signal output by said combining means and said detection signal to output a differential signal;

wherein said control circuit generates a control voltage signal based on said differential signal and supplies said voltage signal to said piezoelectric element to control the approach and separation movement.

22. (Once Amended) A scanning probe microscope comprising:

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a probe close to a sample surface;

a displacement detection mechanism for detecting displacement of said probe in a height direction with respect to the surface of said sample; and

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a control circuit for control so as to hold a distance between said sample and said probe at said reference distance based on a detection signal output by said displacement detection mechanism and a signal relating to the reference distance; wherein

said probe scans said surface to measure said surface while holding the distance between said probe and said sample at said reference distance;

said scanning probe microscope further comprising:

a movement mechanism for making said probe scan the surface of said sample over a predetermined area;

a piezoelectric element for making a position of said probe in a height direction with respect to said sample surface match with said reference distance based on a servo control system at said sampling position; and

an approaching and separating means for making said probe approach to the surface of said sample at said sampling position and making said probe separate from the sample surface during movement between sampling positions;

wherein said probe is made to approach and separate to obtain data at said sampling position by said approaching and separating means at each of a plurality of sampling positions